

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

In The Claims:

1. (Currently Amended) A molten bath testing probe comprising:
a ~~metal~~ one-piece steel body having a pair of integrally formed open, empty sample receptacles in said body, neither of which contains a reference material or test sample, for submersing into a ~~bath of~~ molten aluminum smelting bath material and for holding solely a sample of the molten material;
a temperature sensor received in each said ~~sample~~ receptacle; and
an analyzer in communication with said temperature sensors for determining a difference between the temperature of molten material in the ~~sample~~ receptacles when the receptacles are submersed and the temperature at which the molten material begins to solidify after the body is removed from the bath, where the probe is reusable, said one-piece steel body allowing reheat of any sample to allow sample removal.
2. (Original) The molten bath testing probe of claim 1, wherein said body comprises a central portion, said sample receptacles being positioned on opposing sides of said central portion.
3. (Original) The molten bath testing probe of claim 1, wherein each said temperature sensor comprises a thermocouple extending into an interior of said receptacle.
4. (Original) The molten bath testing probe of claim 3, wherein said thermocouples each comprise a calibrated K-type thermocouple.

5. (Currently Amended) The molten bath testing probe of claim 1, wherein said body is 304 L alloy stainless steel reusable.
6. (Canceled)
7. (Original) The molten bath testing probe of claim 6, wherein said analyzer comprises means for determining freezing temperature of the bath.
8. (Original) The molten bath testing probe of claim 7, wherein said analyzer comprises means for determining superheat of the bath.
9. (Canceled)
10. (Canceled)
11. (Canceled)
12. (Canceled)
13. (Canceled)
14. (Canceled)
15. (Canceled)

16. (Currently Amended) A molten material testing probe comprising:
a one-piece steel body for submersing into a bath of molten aluminum
smelting bath material with comprising a an open, empty sample receptacle for holding a
sample of the molten material and a reference member which is the steel body comprising
a reference material, wherein said sample receptacle and said reference member are
integrally formed in said body from steel, in one-piece a single material;
a sample temperature sensor received in said open sample receptacle;
a reference temperature sensor contacting said reference member material;
and
an analyzer in communication with said sample temperature sensor and said
reference temperature sensor for determining a difference between a temperature of the
any molten material in the receptacle and a temperature of the reference member material,
the analyzer comprising means for determining whether the bath incets predetermined
specifications of the concentration of alumina, the ratio of the amount of aluminum
fluoride to the amount of sodium fluoride, and bath superheat.

17. (Canceled)

18. (Currently Amended) The probe of claim 16 17, wherein said ~~metal~~ is steel
is a stainless steel which does not undergo a phase change during operation of the probe,
during cooling, and the open receptacle does not contain a reference material or test
sample.

19. (Canceled)

20. (Currently Amended) The probe of claim 16, wherein each said
temperature sensor comprises a thermocouple, the steel is 304 L alloy stainless steel, and

the probe is reusable, said one-piece steel body allowing reheat of any sample to allow sample removal.

21. (Original) The probe of claim 20, wherein said thermocouples are calibrated K-type thermocouples.

22. (Canceled)

23. (Canceled)

24. (Currently Amended) A method of testing a bath of molten material comprising:

submersing a one-piece stainless steel probe body into a bath of molten material, the body having a an open, empty sample receptacle for holding a sample of the molten material and a reference member which is the stainless steel body comprising a reference material, wherein the sample receptacle and the reference member are integrally formed in the body from stainless steel, in one-piece a single material, the sample receptacle receiving a sample temperature sensor and the reference member receiving a reference temperature sensor contacting the reference member material;

filling the sample well with the molten material;

removing the probe body from the bath; and

allowing the molten material and the reference member material to cool while measuring a temperature of the cooling molten material and a temperature of the cooling reference member material and determining a difference between the temperature of the cooling molten material and the temperature of the cooling reference material, wherein the stainless steel probe body does not undergo a phase change upon cooling while the molten material does undergo a phase change upon cooling.

25. (Original) The method of claim 24, wherein the bath of molten material is an aluminum smelting bath.
26. (Original) The method of claim 25, wherein the steps are repeated using the same body.
27. (Original) The method of claim 26, further comprising reheating the cooled material and removing the reheated material from the sample receptacle prior to resubmersing the sample container in a bath of molten material.
28. (Original) The method of claim 25, further comprising determining whether the bath of molten material meets predetermined specifications based on the temperature difference for at least one molten material temperature.
- 29, 30. (Currently Amended) The method of claim 28 ~~29~~, wherein the predetermined specifications are ~~selected from the group consisting of~~ alumina concentration, ratio of aluminum fluoride concentration to sodium fluoride concentration, and bath superheat ~~and combinations thereof~~.